

P R A C E K A Z U I S T Y C Z N E  
położnictwo

## Placenta accreta: review and 3 case reports

## Łożysko przyrośnięte – przegląd piśmiennictwa oraz trzy opisy przypadków

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## Abstract

*Placenta accreta is characterized by excessive penetration of the villi into the myometrium, which obstructs its correct separation during stage III of labor. That in turn leads to a potentially life-threatening maternal hemorrhage. Until recently, this pathology has been a rare occurrence but currently it is fifty times more prevalent. Placenta accreta is associated with high morbidity and the risk of maternal death, even despite advances in ultrasonographic diagnostics, well-established surgical treatment, and multi-disciplinary medical care. A dramatic rise in the rates of Cesarean section and intrauterine surgical procedure is considered to be the main factor responsible for the growing incidence of placenta accreta. It is especially frequent in women after a Cesarean section and with placenta previa covering the lower segment. A Cesarean section, combined with hysterectomy and application of various techniques to limit massive bleeding, is usually performed between 34-36 weeks of pregnancy, before the onset of labor. Three cases of placenta accreta are presented.*

Key words: **abnormal placental invasion (API) / placenta accreta / cesarean hysterectomy / peripartum hemorrhage /**

## Streszczenie

*Łożysko przyrośnięte charakteryzuje się nadmierną penetracją kosmków w mięsień macicy uniemożliwiającą jego właściwe oddzielenie w III okresie porodu, co prowadzi do krwotoku groźnego dla życia rodzącej. Ta do niedawna bardzo rzadka patologia spotykana jest obecnie pięćdziesięciokrotnie częściej, a pomimo postępu diagnostyki ultrasonograficznej oraz planowego charakteru zabiegu operacyjnego i wielodyscyplinarnej opieki medycznej obarczona jest wysoką chorobowością i realnym ryzykiem śmierci matki. Dramatyczny wzrost odsetka cięć cesarskich oraz zabiegów wewnątrzmacicznych uważane są za główne czynniki ryzyka. Szczególnie często łożysko przyrośnięte występuje u kobiet po cięciu cesarskim z łożyskiem przodującym pokrywającym dolny odcinek. Cięcie cesarskie połączone z usunięciem macicy i wykorzystaniem różnych technik ograniczających intensywne krwawienie wykonywane jest najczęściej w 34-36 tygodniu ciąży przed wystąpieniem czynności porodowej. Przedstawiono opis 3 przypadków.*

Słowa kluczowe: **nieprawidłowa głębokość placentacji / łożysko przyrośnięte / cięcie cesarskie z usunięciem macicy / krwotok okołoporodowy /**

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## Introduction

The medical term ‘placenta accreta’ refers to different types of abnormally deep attachment of the placenta or its part to the uterine lining. In the most common type, the villi slightly penetrate beyond the decidua basalis, whereas a less common type (13%) – placenta increta – involves deep bulging into the myometrium, and in the least common case (7%) – placenta percreta – intrusion of villi exceeds the perimetrium and may involve the adjacent organs.

Owing to the widespread use of ultrasonographic diagnostics, the initial diagnosis of placenta accreta is usually made antenatally. However, the complication may not be suspected until stage III of labor. In all cases, the condition is associated with the risk of maternal hemorrhage and hypovolemic shock. In Poland, hemorrhages constitute the most important cause of maternal death.

Placental complications, along with uterine atony, are the main causes of peripartum hysterectomy [1]. The frequency of placenta accreta has increased over the last decades, together with Cesarean section rates. In the middle of the last century placenta accreta was found in 1 per 30.000 labors, in the 1970s it was more frequent, at 1 per 4000 labors, during the next decade it reached 1 per 2500 labors, and in recent records from countries characterized by a high rate (30% or more) of Cesarean sections – 1 per 533 labors [2].

## Objectives

The problem of placenta accreta in contemporary obstetrics is discussed and illustrated with 3 cases in 1830 labors which occurred during one year, amounting to the incidence of 1 per 610 labors.

## Case reports

### Case 1

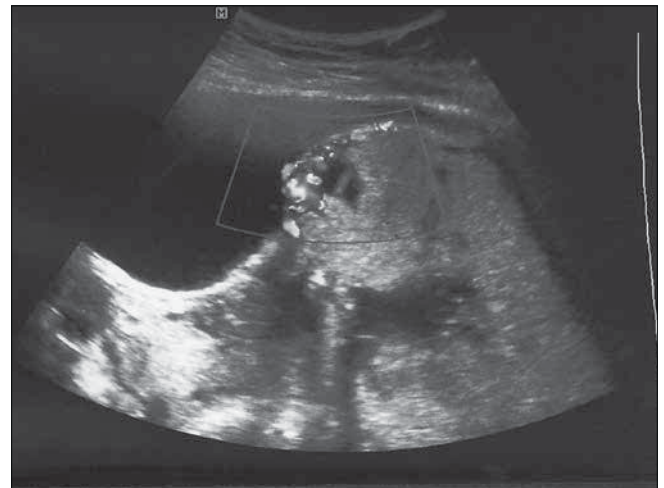
A 33-year-old woman, with a history of 1 miscarriage and 1 elective Cesarean section due to uterus didelphys, was referred at 31 weeks of pregnancy from a community hospital due to episodic bleeding and premature uterine contractions. The fetus presented with a monitored defect – an omphalocele and accompanying slight polyhydramnios. Administration of a tocolytic (nifedipine) was successful, in combination with corticosteroid therapy. Ultrasound revealed pregnancy in the right uterus, placenta previa marginalis anterior, with an area lacking the myometrium and suspicion of villous penetration into the remaining thin ( $\leq 1$  mm) uterine wall. Penetration foci were confirmed by MRI. Cystoscopy was normal.

There were repeated requests from the patient to preserve the uterus due to the uncertain prognosis for the fetus.

### Case 2

A 41-year-old woman with a history of 3 Cesarean sections. The patient required hospitalization since 29 weeks of gestation due to episodic bleeding and pain complaints. An ultrasound examination showed placenta previa centralis and implantation in the lower segment at the length of 6-7cm. On MRI, the placenta was covering the internal cervical os and the whole Cesarean cicatrix. Cystoscopy was normal.

The patient repeatedly requested to preserve the uterus at all costs, as without it the patient would stop feeling feminine.



**Figure 1.** Placenta accreta, ultrasound examination, case 3.

### Case 3

A 33-year-old woman with a history of 2 miscarriages, and 2 Caesarean sections (7 years before, at 29 weeks of pregnancy due to premature labor with shoulder presentation, and 2 years later). The patient was hospitalized earlier in a community hospital due to abdominal pains and episodic bleedings. A pessary was inserted and corticosteroid therapy was administered. She was referred at 28 weeks of pregnancy. MRI images were of low quality due to patient obesity but showed suspected implantation of the placenta. Ultrasound examination revealed a low-lying lower placental edge, thin lower segment (1-2mm), implantation of the placenta into the Cesarean cicatrix at the length of 3-4cm. Cystoscopy showed flushed, loosened mucosae in the trigone area of the urinary bladder.

The patient was mentally prepared for hysterectomy, although hoping to preserve the uterus as she had future plans for procreation in a new relationship.

## Discussion

Placenta accreta was first described and defined in 1937 [3]. It seems that this kind of placental pathology had not been observed earlier. Cesarean section is believed to constitute the main risk factor for the development of placenta accreta. Other risk factors include intrauterine procedures (manual removal of the placenta, surgical abortions, hysteroscopy, removal of submucous fibroids, ablation of the endometrium), as well as embolization in the uterine arteries, uterine defects, adenomyosis, and endometritis. The risk is higher in women aged over 35 years.

Previous damage to the myometrium (loss or lack of the decidua basalis, which is then replaced by loose connective tissue, or a thin myometrium with degenerative lesions, areas of fibrosis, inadequate blood supply and infiltration of inflammatory cells) is considered to be the predominant cause of incorrect placentation. As a result, excessive deep infiltration of trophoblasts takes place, which is especially noticeable when it covers the area of the Cesarean cicatrix. It was proved that extravillous trophoblast cells (EVTs) are present in the maternal placental space [4].

Local hypoxia causes incorrect expression and imbalance of secretion of the vascular endothelial growth factor (VEGF),

placental growth factor (PGF), and soluble fms-like tyrosine kinase-1 (sFlt-1), leading to an excess of VEGF, which seems to play the primary role in the pathological activity and invasiveness of EVTs. Contrary to a previously held hypothesis, the pathology is not a result of a primary defect of trophoblast activity in the form of excessive invasiveness.

Placenta accreta is present in approximately 0.2% of pregnancies with a correctly located placenta, but as many as 5% of pregnancies complicated by placenta previa. Each previous Cesarean section increases the risk of both, placenta previa and placenta accreta.

Silver et al., calculated the probability of the occurrence of both pregnancy complications [5] (Table I).

## Diagnosis

Ultrasound-based transabdominal and transvaginal imaging diagnostics is the basic method of diagnosing placenta accreta, with 77-87% sensitivity and 96-98% specificity.

Ultrasonographic features which confirm placenta accreta, according to the Society for Maternal-Fetal Medicine (SMFM), are as follows [6]:

1. Loss of normal hypoechoic retroplacental zone.
2. Reduced retroplacental myometrial thickness ( $\leq 1$  mm).
3. Chaotic intraplacental blood flow with vascular lacunae (irregular vascular spaces); confluent lagoons, giving a 'Swiss cheese-like' appearance.
4. Blood vessels or placental tissue bridging the uterine-placental margin, myometrial-bladder interface or crossing uterine serosa.
5. Numerous coherent vessels visualized with 3D power Doppler in basal view.

MRI examination may be especially useful if the diagnosis is uncertain due to poor image quality on ultrasound examination, usually caused by obesity, location of the placenta on the posterior wall of the uterus, or a possible invasion of the perimetrium [7].

In the cases described above, the women, driven by various factors, expressed a strong wish to make an attempt to preserve the uterus, although they were informed about the diagnosis, and aware of the risk to their health and even life. A long period of hospitalization was used for psychological counselling. Attempting to save the uterus after the diagnosis of placenta accreta is highly controversial due to the risk of massive bleeding, development of coagulopathy, and a subsequent surgical procedure with hysterectomy conducted under even more difficult hemodynamic conditions. Maternal mortality from placenta accreta is estimated at 6-7%, regardless of the type of the undertaken surgical procedures [8].

The timing of the surgical procedures in the described cases was not accidental. In order to avoid a spontaneous delivery and/or bleeding, as well as an even higher risk of surgical and medical complications, classic Cesarean sections were scheduled and conducted in a timely manner between 35-37 weeks of pregnancy, before the onset of acute symptoms, with a multidisciplinary team (urologist, vascular surgeon) available, and a ready supply of blood preparations. Access to large vessels, arterial line, hemodynamic monitoring and compression stockings were provided; limbs were disposed with hips adducted to allow the assessment of blood loss through the vagina. An experienced anesthesiology

**Table I.** Frequency of placenta accreta according to the number of Cesarean sections and the diagnosis of placenta previa.

Cesarean delivery	Placenta previa (%)	No placenta previa (%)
Primary	3.3	0.03
Second	11	0.2
Third	40	0.1
Fourth	61	0.8
Fifth	67	0.8
Six or more	67	4.7

team allowed the use of combined spinal-epidural analgesia [9]. General anesthesia, which is generally preferred in some medical centers, was used only for the re-surgery with hysterectomy (case 3).

The mothers gave birth after corticosteroid therapy to late-preterm infants in good overall condition, without subsequent complications during the neonatal period. The neonates from pregnancies complicated by placenta accreta usually have a smaller birth weight due to an iatrogenic late premature delivery. However, in some cases disorders of oxygen and nutrient transportation through a functionally altered maternal placental exchange space may also contribute to intrauterine growth restriction [10].

After delivery, the internal iliac arteries were ligated, without intrusion into the placenta, followed by administration of carbetocin (100mcg iv) and partially spontaneous separation of the placenta. Attempts to save the uterus - removing the parts involved in the areas of implantation and then reconstructing the uterine wall - were possible due to small areas of implantation in cases 1 and 2. However, the attempt itself, which was linked with separation of the placenta, was associated with abundant bleeding, even after clamping and ligation of the internal iliac arteries. Mean duration of the procedure was 2h 30m, with estimated blood loss of 2000-4500ml.

Application of square sutures, with a 3cm side length, to the myometrium, as described by Cho et al., may help to achieve hemostasis. However, it requires time and induces numerous adhesions [11, 12].

The most frequent procedure in case of prior diagnosis of placenta accreta is an elective classic Cesarean section, in principle after 34 weeks of pregnancy (depending on the clinical symptoms and the probable scale of implantation), combined with a hysterectomy which is conducted following the delivery of a late-preterm infant, closure of the umbilical cord without attempting to separate the placenta, and after suturing the uterus in order to limit the intensification of blood loss from the edges of the incision.

Only Eller and colleagues have questioned the usefulness of ligation of the internal iliac arteries. Intraoperative embolization of the vessels (internal iliac and uterine) under X-ray control, which requires considerable time as well as transportation of an unstable patient, is also considered to be helpful [13]. Unfortunately, supplementation of the uterine blood supply is characterized by a vast network of connections stemming from

the abdominal aorta, external iliac arteries and femoral arteries. After ligation of the internal iliac arteries, these vessels are capable of maintaining blood flow in the area under the surgical procedure. In addition, incorrect placentation which stimulates VEGFs leads to the development of thick, wide vessels which, especially in the area of the urinary bladder, may provoke bleeding that is difficult to control. The bulging of the trigone creates a network of colpouterine anastomoses which connect the aortic uterine branches (pudendal, internal) with the lower uterine arteries, all of which makes attempts to achieve hemostasis extremely difficult, as circular compressive sutures are required in this delicate area. Similarly, attempts to embolize the vessels may lead to tissue damage, anoxia and even necrosis as a result of application of the requisite number of particles and high pressure [14].

A series of preoperative cases was described in which, under ultrasonographic control, balloons were inserted into the common iliac arteries. In cases of abundant postpartum bleeding, the balloons were filled in preparation for hysterectomy. If the patient was stable after suturing the uterus and closing the integuments in the interventional angiography ward, selective embolization of the uterine vascular bed was conducted with 500-700µm polyvinyl alcohol (PVA), prior to subsequent hysterectomy [7]. It appears that such procedures may improve the results of surgery but they require a lot of precious time - a few hours - and may lead to additional complications in the form of hematomata, tissue damage, ischemia or necrosis, and the creation of abscesses.

The literature provides descriptions of cases in which the placenta was not removed from the uterus and postoperative administration of methotrexate – an antagonist of folic acid – in combination with antibiotic cover, ultrasonographic monitoring of the uterine volume and monitoring of the concentration of blood levels of  $\beta$ -HCG were applied. Some of these cases were followed by delayed hemorrhage, infection, uterine necrosis, subsequent surgery, and hysterectomy.

Even with a scheduled surgical procedure carried out by and experienced surgeon, it is possible that complications may arise in the form of damage to the adjoining organs (mainly the urinary bladder or the ureter), or vessels and nerves in the retroperitoneal space. Some authors suggest that routine insertion of ureter stents may be advantageous.

In principle, a large loss of blood (approximately 2000-5000ml) requires a transfusion and poses a threat due to the risk of underestimation of losses and the development of coagulopathy caused by dilution or consumption, a possibility of post-transfusion disorders in response to the amount and type of transfusions and electrolyte irregularities, and developing ARDS (Acute Respiratory Distress Syndrome). Frequently, it is necessary to re-operate. In extremely difficult situations, the placement of pelvic pressure packing is used and the surgical procedure is postponed until the patient is stable again.

Detailed monitoring of the vital signs, diuresis, administered fluids, heart function, kidneys and other organs, normalization of coagulation parameters, wound care, drainage, and the process of healing usually requires a stay of variable length in an intensive care unit.

Data are limited regarding the course of pregnancy after conservative treatment. Sentilhes and colleagues collected histories of 34 pregnancies in a retrospective multi-center study. Twenty-

one out of 34 cases terminated successfully with delivery of a healthy infant >34 weeks of pregnancy; but in 6 of these cases (28.6%) placenta accreta recurred, including 4 cases with placenta previa [15]. A massive hemorrhage, posing a threat to maternal life, occurred in 4 cases (19%).

## Conclusions

Placenta accreta is a complication of pregnancy with a steadily increasing incidence rates. Especially when the following risk factors are present – placenta previa, low-lying placenta, in particular when it is covering the Cesarean cicatrix – an attempt at antenatal diagnosis or exclusion of placenta accreta should be made. An ultrasound examination, 3D power Doppler imaging and supplementary MRI have high diagnostic sensitivity and specificity.

A scheduled late preterm Cesarean section followed by hysterectomy in a multi-profile tertiary referral center appears to be the most common treatment, though it is not free from hemorrhage complications and involves a serious mutilation of a young woman.

Meticulous anesthetic provision and preparation of many units of blood and associated blood products increase the chances of avoiding hypovolemic shock.

The procedure aiming at saving the uterus – which consists of removing the placenta together with the implanted myometrium and reconstructing the uterine anatomy – may be undertaken after a detailed analysis of each individual case, bearing in mind the risk of maternal morbidity and mortality.

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